REMARKS

Reconsideration and allowance of the subject application are respectfully requested. By this Amendment, Applicant has added new claims 11 and 12. Thus, claims 1-12 are now pending in the application. In response to the Office Action (Paper No. 5), Applicant respectfully submits that the pending claims define patentable subject matter. By this Amendment, Applicant has amended claims 1 and 4 to improve clarity.

Claims 1, 3, 4, 6 and 8-10 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Asao et al. (USP 6,049,154; hereafter "Asao") in view of Kitamura et al. (USP 4,739,204). Claim 2 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Asao in view of Kitamura and Adachi (USP 5,798,586). Claims 5 and 7 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Asao in view of Kitamura and Ishida (USP 5,708,316). Applicant respectfully traverses the prior art rejections of record.

Amended independent claim 1 recites, in part, "a coil end group of said stator winding is constructed such that coil ends folded back outside said slots at an end surface of said stator core are arranged circumferentially ... [and] a predetermined region of outer surfaces of said coil ends in a radial direction of said stator core forms a continuous circumferentially-smooth heat-conducting surface, said outer surfaces facing radially outwards from said stator core and extending from a vicinity of said end surface of said stator core to apex portions of said coil ends".

As shown in Figure 3, the stator 10 includes a stator winding 12 installed in a stator core 11, wherein coil end groups 12f and 12r of the stator winding 12 are constructed by arranging

coil ends 12a in rows circumferentially, the coil ends 12a extending out from first slots 11a, folding over at end surfaces of the stator core 11, and entering second slots 11a a predetermined number of slots away. However, unlike conventional stator windings (see Figure 23), the outer circumferential surfaces of the coil ends 12a form a continuous circumferentially-smooth heat-conducting surface 28.

As discussed on page 12 of the specification with regards to Figure 6, the winding 12 is formed by rolling the coil end groups 12f and 12r via rotating rollers 31 while pressing the rollers 31 against the coil end groups 12r and 12f from a radially outer side. Thus, in a region where outer circumferential surfaces of the coil end groups 12f and 12r come into contact with the rollers 31, circumferential irregularities are flattened by the rollers 31 to obtain the stator 10 shown in Figure 3. That is, the outer circumferential surfaces of the coil end groups 12f and 12r are reshaped uniformly in a circumferential direction and irregularities between the coil ends 12a are eliminated on the outer circumferential surfaces of the coil end groups 12f and 12r, thereby forming a circumferentially-smooth heat-conducting surface 28.

The Examiner maintains that Asao (prior art Figs. 7-14) discloses the claimed structure of the stator winding. However, as shown in Figures 7 and 8 of Asao, the conventional stator includes stator windings 3, wherein coil strands are inserted into every third slot 2a around the core coil strands to form three phases of stator windings 3 with a first phase of stator winding 3 (external winding 3A) being wound around the radially outer edge of the stator core 2, a second phase of stator winding 3 (internal winding 3B) wound around the inner edge, and a third phase of winding 3 (intermediate winding 3C) being wound between the other two. Thus, similar to

the conventional stator shown in Figure 23 of the present application, outer circumferential surfaces of coil end groups of the stator winding of Asao have large irregularities in a circumferential direction. Further, because the positions of the slender copper wires in the coil ends are not specified, large irregularities occur on surfaces of the coil ends. Lastly, because the coil ends are formed into bundles of slender copper wires, the slender copper wires are not in close contact with each other in the coil ends, making thermal conductivity in the coil ends poor.

Accordingly, Applicant respectfully submits that Asao does not teach or suggest a predetermined region of outer surfaces of the coil ends in a radial direction of said stator core forms a continuous circumferentially-smooth heat-conducting surface, as recited in claim 1. Similarly, Applicant respectfully submits that it is quite clear that Adachi, Kitamura and Ishida, alone or in combination, do not teach or suggest this feature of the claimed invention.

Kitamura discloses that the coil end is surrounded by the enclosure 24 formed of a metal such as aluminum, and an insulating filler 25 such as synthetic resin fills the spaces between the enclosure 24 and the coil end. Further, the Examiner presumes that the enclosure 24 corresponds to the circumferentially-smooth heat-conducting surface.

Therefore, even if the coil end of Asao was surrounded with the enclosure 24 of Kitamura and the spaces between the coil end and the enclosure filled with the resin in order to improve heat conduction from the coil ends to the cooling channel, the outer surfaces of the coil ends of Asao et al. would be formed into the circumferentially-smooth heat-conducting surface.

Accordingly, Applicant respectfully submits that independent claim 1, as well as dependent claims 2 and 3, should be allowable because the combined references do not teach or suggest all of the features of the claims.

By this Amendment, Applicant has rewritten claim 4, which was originally dependent upon claim 1, in independent form. Applicant respectfully submits that the combination of Asao and Kitamura does not teach or suggest the stator winding in which each of the strands of wire is wound at an interval of a predetermined number of slots so as to alternately occupy an inner layer and an outer layer in a slot depth direction within the slots, and turn portions of the strands of wire are lined up generally uniformly in a circumferential direction, as claimed. Rather, Asao discloses that the strands of wire occupy the same layer in a slot depth direction within the slots with the turn portions of the strands of wire lined up in the radial direction. Similarly, Kitamura fails to teach or suggest this feature of the claimed invention.

Further, Applicant respectfully submits that the combined references do not teach or suggest the features dependent claims 6 and 8. That is, the applied references do not teach or suggest (1) the turn portions are disposed circumferentially so as to line up in a plurality of rows radially with radially-adjacent turn portions being in general contact with each other, as recited in dependent claim 6, or (2) the turn portions are disposed circumferentially such that intermediate portions of the turn portions are in close proximity with each other, the intermediate portions being between portions where the turn portions extend out from the slots and portions where said turn portions are folded back, as recited in dependent claim 8.

Lastly, with regards to dependent claim 9, Asao does not disclose a resin filling the gaps between the turn portions, as the Examiner contends.

Accordingly, Applicant respectfully submits that independent claim 4, as well as dependent claims 5-10, should be allowable because the combined references do not teach or suggest all of the features of the claims.

By this Amendment, Applicant has added new dependent claims 11 and 12 to further define the claimed invention. Applicant respectfully submits that new claims 11 and 12 should be allowable at least by virtue of their dependency upon independent claim 4.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

Applicant hereby petitions for any extension of time which may be required to maintain the pendency of this case, and any required fee, except for the Issue Fee, for such extension is to be charged to Deposit Account No. 19-4880.

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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

The claims are amended as follows:

1. (Amended) An automotive alternator comprising:

a stator having a stator core formed with slots extending axially at a predetermined pitch in a circumferential direction and a stator winding installed in said stator core;

a rotor rotatably disposed on an inner circumferential side of said stator; and

a bracket for supporting said stator and said rotor,

wherein a coil end group of said stator winding is constructed such that coil ends folded back outside said slots at an end surface of said stator core are arranged circumferentially,

wherein a predetermined region of outer surfaces of said coil ends in a radial direction of said stator core [constitutes a] forms a continuous circumferentially-smooth heat-conducting surface, said outer surfaces facing radially outwards from said stator core and extending from a vicinity of said end surface of said stator core to apex portions of said coil ends, and

wherein a distribution channel for a liquid coolant is disposed for absorbing heat generated in said stator and conducted from said heat-conducting surface.

4. (Amended) [The] An automotive alternator [according to claim 1] comprising:

a stator having a stator core formed with slots extending axially at a predetermined pitch in a circumferential direction and a stator winding installed in said stator core;

a rotor rotatably disposed on an inner circumferential side of said stator; and

a bracket for supporting said stator and said rotor,

wherein said stator winding is provided with a plurality of winding sub-portions each constructed by installing a strand of wire at intervals of a predetermined number of slots so as to alternately occupy an inner layer and an outer layer in a slot depth direction within said slots, turn portions of said strands of wire which are folded back outside said slots at said end surface of said stator core forming said coil ends and lining up generally uniformly in a circumferential direction to constitute a coil end group,

wherein a predetermined region of outer surfaces of said coil ends in a radial direction of said stator core forms a circumferentially-smooth heat-conducting surface, said outer surfaces facing radially outwards from said stator core and extending from a vicinity of said end surface of said stator core to apex portions of said coil ends, and

wherein a distribution channel for liquid coolant is disposed for absorbing heat generated in said stator and conducted from said heat-conducting surface.

Claims 11 and 12 are added as new claims.